

## **Description of a new *Colostethus* (Dendrobatidae) with some natural history comments on the genus in Venezuela**

Jaime E. PÉFAUR

Ecología animal, Facultad de Ciencias,  
Universidad de los Andes, Mérida, Venezuela

**A new species of a non-collared *Colostethus* from the Andes of Venezuela is described. The new species is a large, robust form with basally webbed toes and a well developed supratympanic fold. Some biogeographical and natural history comments on the genus in Venezuela are made. Most Andean species of *Colostethus* (84 %) are non-collared, and the vast majority occur in cloud forest at elevations of 2000-3000 m, while most of the species in the non-Andean group occur at 1500 m and lower.**

In the last few decades, knowledge of the herpetofauna of western Venezuela has been enriched with the description of several new species of dendrobatid frogs, especially from the highlands of the Cordillera de Mérida. DOLE & DURAND (1972) named *Colostethus meridensis*, RIVERO (1978) described three new species from the páramos, and later (1980), four new species from cloud or humid forests and subpáramos. More recently, PÉFAUR (1985) discovered two new Andean species, and LA MARCA (1985) named another one from similar environments.

The new species described below occurs at the upper edge of the cloud forest in the mountains of the southern part of the state of Mérida. All specimens used in the descriptions and comparisons are deposited in the Colección de Vertebrados de la Universidad de Los Andes, Mérida, Venezuela (CVULA).

### ***Colostethus capurinensis* new species**

(figs. 1-2)

**Holotype.** CVULA IV.1063, an adult female from below Páramo El Molino, via Canaguá, on the Sierra Nevada, 2420 m, Distrito Arzobispo Chacón, Municipio Libertad, Estado Mérida, Venezuela; collected by Haydee LAUKENINKS DE HITA, Amelia DIAZ DE PASCUAL and Hans KONTAC on 3 July 1979.

**Paratypes.** – CVULA IV.1064-65, two adult females, collected with the holotype.



Fig. 1. — Ventral and dorsal view of *Colostethus capurmensis*. Picture of preserved specimens CVULA IV.1063 (holotype) and IV.1064 (paratype).

**Diagnosis.** — (1) A robust and relatively large *Colostethus*, females 33.2 to 33.8 mm (mean 33.4 mm) in snout-vent length (SVL), males unknown; (2) sexual differences unknown; (3) dorsal skin smooth, pustular around vent, areolate on flanks, smooth on venter; (4) tympanum indistinct; (5) supratympanic fold well developed, covering about one-third of tympanum; (6) first finger shorter than second; (7) finger discs distinctly expanded, subequal in size, wider than finger width, third finger disk smaller than tympanum diameter; (8) unknown if third finger of males is swollen; (9) digital scutes distinct; (10) tarsal fold oblique, extending from inner metatarsal tubercle to middle of tarsus, metatarsal fold absent; (11) toes basally webbed, lateral fringes present in all toes; (12) toe discs expanded, about equal in size, wider than toe width; (13) dorsolateral stripes present but indistinct; (14) oblique lateral stripe absent, (15) ventrolateral stripe absent; (16) dorsal ground color dark brown; (17) ventral ground color creamy with light to heavy brown marbling; (18) thighs dorsally light brown, with dark brown transverse bars, ventrally creamy-yellowish with brown arcolae lighter than belly; (19) unmodified vent; (20) sacral fold absent.

**Description and variation.** — Head slightly longer than wide. Head width of paratypes 10.4 and 11.0 mm, of holotype 11.0 mm. Ratio of head width to snout-vent length 0.31 to 0.33;

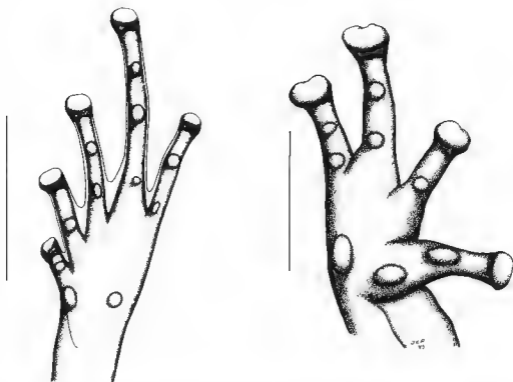


Fig 2 - Hand and foot of *Colostethus capurmensis*. Left, sole of left foot; right, palm of right hand. Drawings from specimens CVULA IV.1064. Scale lines represent 10 mm.

snout short, subovoid to round, sloping in lateral profile; canthus rostralis not well defined; loreal region slightly concave. Nostril lateral, prominent, closer to tip of snout than to corner of eye; diameter of eye smaller than distance between eye and tip of snout; tympanum semicircular, its diameter slightly larger than half diameter of eye; supratympanic fold heavy; tongue cordiform to pyriform, not notched; posterior edge free; choanae small, more than one-half visible when viewed directly from below.

Dorsum and venter smooth, some tubercles on vent and dorsolateral stripes areas; flanks areolate. Legs with some tubercles above; cloacal opening unmodified; forearms lacking tubercles; inner palmar tubercle ovoid, smaller than outer tubercle; outer tubercle almost rounded, elevated; subarticular tubercles round, elevated; basal subarticular tubercles larger than distal, fingers lacking webbing, but with very narrow lateral fringe present in all of them; finger discs subequal in size.

Ratio of tibia to SVL 0.46 to 0.48, tibia length in paratypes 15.3 and 16.2 mm, holotype 16.2 mm. Inner tarsal fold short, oblique, inner plantar tubercle ovoid, outer round, smaller, elevated; toe subarticular tubercles small and round. Toes conspicuously webbed between toes II-III and III-IV, toes IV-V with only slight webbing, toes I-II free,

lateral fringe present in all toes extending to disc bases (fig. 2); toe webbing according to RIVERO's (1961) system I 1/2, 1 3/4, 3, 4 1/4, 2 3/4; according to SAVAGE & HEYER's (1967) system I 1.5-2.5 II 1.75-3.25 III 3<sup>-</sup>-4<sup>+</sup> IV 4.25-2.75 V.

*Coloration.* — In preservative, dorsal ground color of adults dark brown with indistinct white dots; dorsolateral stripes ash-white, extending from posterior border of eye to groin area. A wide brown stripe below dorso-lateral stripe, darker than color of dorsum. Flanks with ash-white dots. Lips brown with some white dots. Arms light brown crossed by dark-brown bars dorsally, with small dark-brown points scattered all over, concentrating in fingers becoming almost solid brown. Thighs, tibiae and feet brown and crossed by poorly defined transverse dark-brown bars dorsally. Legs creamy-yellowish ventrally with scattered dark-brown points, making an areolate pattern on anterior and posterior faces of thighs and tibiae; points concentrated distally on feet making the toes almost solid brown. Throat, chest, and belly creamy-whitish ground color, with brown specks all over, producing an areolate pattern on throat and on area contiguous to the flanks. Conspicuous absence of these specks at the base of insertion of arms, giving the impression of a "sleeveless sweater" for the color of that area. Ventral sides of fingers and toes with fine yellow lines extending from discs to distal subarticular tubercles.

*Comparisons* — In having basally webbed toes, *Colostethus capurinensis* is readily separated from the other Venezuelan members of the genus that lack toe webbing as well as from those that have extensive toe webbing. Of those species having basally webbed toes, all are clearly smaller than *C. capurinensis*, with the exception of *C. leopardalis* and *C. meridensis*. The largest individuals of the latter two species are as large as the smaller adult of *C. capurinensis* (RIVERO, 1980; DOLE & DURANT, 1972). The only Venezuelan *Colostethus* larger than this new species are *C. riveroi*, which has distinctly webbed toes and the first finger longer than the second (DONOSO-BARROS, 1964), and *C. oblittratus* (= *guatopoensis*), which has fully webbed toes (RIVERO, 1984b; DIXON & RIVERO-BLANCO, 1985). *Colostethus capurinensis* has a longer head and more extensive toe webbing than *C. leopardalis*. The particular coloration of *C. meridensis* as well as its toe webbing condition separates it from *C. capurinensis*. The dull brown general coloration of *C. capurinensis* separates it readily from *C. duranti*, which has a dorsal ground light gray color with irregular dark blotches and well defined creamy white dorsolateral stripes.

*Natural history.* — This frog lives under small flat stones in and in the vicinity of cold waters streams above 2400 m, in cloud forest immediately below Páramo El Molino, in the Andes of Mérida. As is true for most of the other Andean *Colostethus*, this species has been found only around the type locality. This area is characterized by a wet climate, with rainfalls from April to November (fig. 3), frequent cold winds, heavy misty days, and a vegetation dominated by short to medium sized shrubs and herbs and some scattered trees, 5 to 10 meters tall. On one side of the mountains, streams form the headwaters of the Capurí River, a small high mountane tributary of the Negro River. The Negro River is a tributary of the larger Uribante, which flows towards the Llanos Occidentales to form the Apure River. On the other side of the mountains, gullies and streams drain to the Mocoties River, a tributary of the Chama, which flows toward Lake Maracaibo. The landscape of this Andean area has been drastically changed in recent years, due to large sections of forests having been cleared for pastures. Another *Colostethus*, *Atelopus oxyrhynchus* and

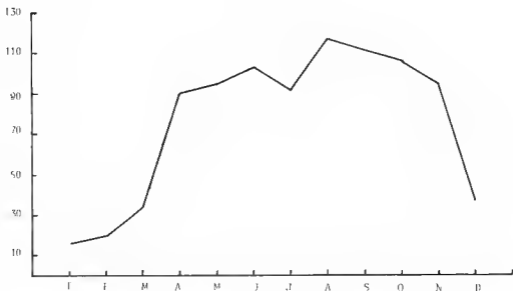


Fig. 3 Annual distribution of rainfall (1967-1990) at the climatic station of El Molino, Estado Mérida, Venezuela, about 10 km south from the type locality of *Colostethus capurnensis*.

*Hyla platydaactyla* have also been collected in the area. Males have not been heard calling at any time of our visits to the area.

*Etymology.* - The name *capurnensis* is derived from "Capuri", the name of the river in whose headwaters the species lives.

*Comments.* - The genus *Colostethus* has undergone an intensive speciation process in the highlands of western Venezuela: 55 % of all species of the country are found there. According to RIVERO (1990), most *Colostethus* species of these highlands form a very compact unit, called Group VIII, but the collared species *C. collaris* belongs to Group VII, while *C. humilis* and *C. meridensis* are considered as "doubtful" and are not included in any group. The new species herein described would also belong to RIVERO's Group VIII.

RIVERO (1978, 1979, 1980, 1990) has emphasized the importance of the presence or absence of a black pectoral collar among the species of the genus to establish phylogenetical relationships. In Venezuelan mountane and forested areas, the majority of the species are non-collared - ten out of 13 species belong to this group. Among the non-Andean *Colostethus*, the non-collared species outnumber the collared ones (Table I). Non-Andean species encompass all *Colostethus* whose distribution falls out of the Venezuelan Andes, as described by PÉFAUR & DIAZ DE PASCUAL (1982). Thus, all species dwelling in the coastal range or in southern Venezuela are considered as non-Andean.

Study of numerous specimens of the different Andean species of *Colostethus* permits a rearrangement based on certain anatomical characters. In Table II, the 13 presently

Table I. - Presently recognized species of non-Andean Venezuelan *Colostethus*.

Group	
Collared	Non-collared
<i>trinitatis</i> (= <i>herminae</i> )	<i>bromelicola</i>
<i>oblitteratus</i> (= <i>guatopoensis</i> )	<i>brunneus</i>
<i>riveroi</i>	<i>dunni</i> *
	<i>mandelorum</i>
	<i>sanmartini</i>
	<i>shrevei</i>

\* The inclusion of this species in this group is doubtful (see EDWARDS, 1974b; RIVERO, 1984b).

Table II. - Arrangement of *Colostethus* from the Mérida Andes, Venezuela, based on webbing of toes.

Toes webbed	Unwebbed toes
A. Basally webbed	A. Toe fringe present
<i>alboguttatus</i>	<i>mayorgai</i>
<i>capurmensis</i>	
<i>duranti</i>	B. Toe fringe absent
<i>humilis</i>	<i>haydecae</i>
<i>leopardalis</i>	
<i>meridensis</i>	
<i>molinari</i>	
<i>orostoma</i>	
<i>saltuensis</i>	
<i>serranus</i>	
B. Distinctly webbed	
<i>collaris</i> *	

\* Collared species.

Table III. - Elevational distribution of *Colostethus* from the Mérida Andes, Venezuela.\*

Species	Elevational belts* (in m)					
	500 1000	1000 1500	1500 2000	2000 2500	2500 3000	3000 up
<i>alboguttatus</i>			*	*		
<i>capurinensis</i>				*		
<i>collaris</i>	*	*	*	*		
<i>duranti</i>					*	
<i>haydeeeae</i>				*		
<i>humilis</i>			*			
<i>leopardalis</i>					*	*
<i>mayorgai</i>			*	*		
<i>meridensis</i>			*			
<i>molinari</i>			*	*		
<i>orostoma</i>				*		
<i>saltuensis</i>	*					
<i>serranus</i>				*		
Total	2	1	6	8	2	1

\* Records are from CVULA as from the literature.

recognized Venezuelan species (PÉFAUR, 1992) are arranged according to web characters. *Colostethus meridensis* is here included among frogs with basally webbed toes rather than in the "distinctly webbed" category (EDWARDS, 1974a), after examination of many specimens from the type locality at El Chorotal, La Azulita, Estado Mérida: none of the studied specimens has sufficient webbing to be included in the latter division, as is the case of *C. collaris*. Also, the transfer of *C. alboguttatus* from the "not webbed toes" category (EDWARDS, 1974a-b) to "webbed toes" is based on the study of specimens from different parts of the Mérida Andes. Among these specimens, an interdigital membrane between toes II-III and III-IV was observed, albeit with a high degree of interindividual variation. In the list provided in Table II, *C. inflexus* (RIVERO, 1980) has not been included, because RIVERO (1984a) considered it a synonym of *C. alboguttatus*. A revision of *C. alboguttatus* is in order.

An analysis of the elevational distribution of the members of the genus *Colostethus* in the Venezuelan Andes (Table III) shows that this is mainly a genus of highlands - twelve species are found above 2000 m, while only three species are found below 1000 m: *C.*

*collaris*, *C. humilis* and *C. saltuensis* in cloud or rain-forest environments. The species reaching the lowest limits is *C. collaris* (PÉFAUR & DIAZ DE PASCUAL, 1982; PÉFAUR, 1987), which has populations in the piedmont of the eastern versant of the Andes in the States of Barinas and Portuguesa. Most species occur in the 2000 to 3000 m belt in cloud-forest or subpáramo environments. The only species living under páramo conditions, above 3000 m, is *C. leopardalis*. Non-Andean *Colostethus*, on the other hand, occur in Venezuela mostly from 500 to 1500 m, with some populations of *C. trinitatis* living close to sea level.

### RESUMEN

Se describe una nueva especie de anfibio no-acollarado del género *Colostethus* (Dendrobatidae) proveniente de ambientes de Selva Nublada de los Andes Merideños de Venezuela. La nueva especie es de tamaño grande y bastante robusto, posee tímpano indistinto con un pliegue timpánico bien desarrollado y dedos con palmeadura basilar; dorsalmente es de color marrón oscuro, y el vientre es crema con reticulaciones marrones.

La descripción de esta especie permite señalar una serie de consideraciones taxonómicas y biogeográficas para los *Colostethus* venezolanos. El 84 % de las especies andinas y el 66 % de las especies no andinas carecen de collar pectoral. La mayor parte de las especies andinas se encuentran en la faja altitudinal de los 2000-3000 m, mientras que la gran mayoría de los *Colostethus* no andinos se encuentran por debajo de los 1500 metros.

### ACKNOWLEDGEMENTS

I am indebted to the people of the Animal Ecology Group, Faculty of Science, Universidad de Los Andes, for their constant support. Nancy M. SIERRA provided helpful curatorial assistance. J. A. RIVERO and two anonymous reviewers read critically the manuscript improving it. This study was done under CDCHT - Universidad de Los Andes Project TC-02-90/91.

### LITERATURE CITED

- DIXON, J. R. & RIVERO-BLANCO, C., 1985. - A new dendrobatid frog (genus *Colostethus*) from Venezuela, with notes on the natural history of it and related species. *J. Herpet.*, **19**: 177-184.
- DOLE, J. W. & DURANT, P., 1972. - A new species of *Colostethus* (Amphibia: Salientia) from the Mérida Andes, Venezuela. *Caribb. J. Sci.*, **12**: 191-193.
- DONOSO-BARRIOS, R., 1964. - A new Dendrobatidae frog, *Prostherapis riveroi* from Venezuela. *Caribb. J. Sci.*, **4**: 485-489.
- EDWARDS, S. R., 1974a. - Taxonomic notes on South American frogs of the genus *Colostethus*. *Occ. Pap. Mus. nat. Hist. Univ. Kansas*, **30**: 1-14.
- 1974b. - *A phenetic analysis of the genus Colostethus (Anura: Dendrobatidae)*. Ph. D. Dissertation, Univ. Kansas, Lawrence, Mimeo: 1-419.
- LA MARCA, E., 1985. - A new species of *Colostethus* (Anura: Dendrobatidae) from the Cordillera de Mérida, northern Andes, South America. *Occ. Pap. Mus. Zool. Univ. Michigan*, **710**: 1-10.



- PÉFAUR, J. E., 1985. - New species of Venezuelan *Colostethus* (Dendrobatidae). *J. Herpet.*, **19**: 321-327.
- 1987. - First record of *Colostethus* (Dendrobatidae) in the Llanos of Venezuela. *Caribb. J. Sci.*, **23**: 338-339.
- 1992. - Checklist and bibliography (1960-85) of the Venezuelan herpetofauna. *Smithsonian herpet. Info. Serv.*, **89**: 1-54.
- PÉFAUR, J. E. & DIAZ DE PASCUAL, A., 1982. - Aspectos biogeográficos de las comunidades de anfibios y saurios de los Andes Venezolanos. *Actas VIII Congr. Latnam. Zool.*: 229-261.
- RIVERO, J. A., 1961. - Salientia of Venezuela. *Bull. Mus. comp. Zool. Harvard Univ.*, **126**: 1-207.
- 1978. - Notas sobre los anfibios de Venezuela. II. Sobre los *Colostethus* de los Andes venezolanos. *Mem. Soc. Cien. nat. La Salle, Caracas*, 1976, **36**: 327-344.
- 1979. - Sobre el origen de la fauna paramera de anfibios venezolanos. In: M. L. SALGADO-LABORIAU (ed.), *El medio ambiente páramo*, Caracas, IDEEA: 165-175.
- 1980. - Notas sobre los anfibios de Venezuela. III. Nuevos *Colostethus* de los Andes venezolanos. *Mem. Soc. Cien. nat. La Salle, Caracas*, 1978, **38**: 95-111.
- 1984a. - Sobre el *Colostethus mandelorum* (Schmidt) y el *Colostethus inflexus* Rivero (Amphibia: Dendrobatidae). *Mem. Soc. Cien. nat. La Salle, Caracas*, 1982, **42**: 9-16.
- 1984b. - Una nueva especie de *Colostethus* (Amphibia, Dendrobatidae) de la Cordillera de la Costa, con anotaciones sobre otros *Colostethus* de Venezuela. *Brenesia*, **22**: 51-56.
- 1990. - Sobre las relaciones de las especies del género *Colostethus* (Amphibia, Dendrobatidae). *Mem. Soc. Cien. nat. La Salle, Caracas*, 1988, **129**: 3-32.
- SAVAGE, J. M. & HEYER, W. R., 1967. - Variation and distribution of the tree-frog genus *Phyllomedusa* in Costa Rica, Central America. *Betr. neotrop. Fauna*, **5**: 111-131.

Corresponding editor: W. RONALD HEYER.